

1     What is claimed is:

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3     1.     A data processing system, comprising:

4             a plurality of hosts;

5             a plurality of data storage devices; and

6             an apparatus coupling the hosts to the data storage devices, the apparatus having

7     host ports connected to the hosts, wherein the data storage devices are configured into

8     logical storage units, the apparatus is programmed with a mapping of the hosts to

9     respective logical storage units, and the apparatus is programmed to permit data access

10    of a logical storage unit by the host to occur through a host port upon receipt at the host

11    port of a request from the host for access to the logical storage unit when the request

12    from the host for access to the logical storage unit is in conformance with the mapping,

13    and the apparatus is programmed to deny data access by the host through the host port

14    upon receipt at the host port of a request from the host for data access that is not in

15    conformance with the mapping.

16

17    2.     The data processing system as claimed in claim 1, wherein the apparatus is

18    programmed to respond to receipt at the host port of the request from the host for access

19    to the logical storage unit by decoding a host identifier and a logical storage unit

20    specification from the request for access to the logical storage unit, and determining

21    whether or not the host identifier and the logical storage unit specification decoded

22    from the request for access to the logical storage unit are in conformance with the

23    mapping, and upon determining that the host identifier and the logical storage unit

24    specification decoded from the request for access to the logical storage unit are in

1 conformance with the mapping, permitting data access of the logical storage unit to  
2 occur at the host port.

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4 3. The data processing system as claimed in claim 1, wherein the mapping  
5 prohibits each host from accessing all of the logical storage units.

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7 4. The data processing system as claimed in claim 1, wherein the mapping includes  
8 a respective mapping for each host of logical unit numbers of storage to data storage  
9 volumes configured from the data storage devices.

10

11 5. The data processing system as claimed in claim 4, wherein the mapping restricts  
12 the data storage volumes that are visible to said each host.

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14 6. The data storage system as claimed in claim 4, wherein the apparatus is  
15 programmed to report to said each host the logical unit numbers of storage accessible to  
16 said each host.

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18 7. The data processing system as claimed in claim 1, wherein the apparatus  
19 includes a graphical user interface for permitting a user to program the mapping of the  
20 hosts to the respective logical storage units.

21

22 8. The data processing system as claimed in claim 1, wherein the apparatus  
23 includes a switch for routing the data storage access requests from the host ports to  
24 ports that provide access to the data storage.

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2 9. The data processing system as claimed in claim 8, wherein the apparatus is  
3 programmed with a mapping of the hosts to the ports that provide access to the data  
4 storage.

5

6 10. The data processing system as claimed in claim 9, wherein the apparatus is  
7 programmed with a mapping of logical volumes of storage that are accessible from each  
8 of the ports that provide access to the data storage.

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10 11. The data processing system as claimed in claim 8, wherein one or more of the  
11 ports that provide access to the data storage are assigned to each host, a set of storage  
12 volumes are made accessible from each of the ports that provide access to the data  
13 storage, and the apparatus is programmed so that said each host can access storage at  
14 said each of the ports that provide access to the data storage only if said each of the  
15 ports that provide access to the data storage has been assigned to said each host.

16

17 12. The data processing system as claimed in claim 8, wherein the mapping includes  
18 a respective mapping for each host of logical unit numbers of storage to data storage  
19 volumes that are configured from the data storage devices and are accessible to said  
20 each host, and the apparatus is programmed to respond to a request directed to said each  
21 of the ports from said each host for a report of the logical unit numbers of storage that  
22 are accessible to said each host from said each of the ports that provide access to the  
23 data storage by providing a report of the logical unit numbers of storage that are

1 accessible to said each host from said each of the ports that provide access to the data  
2 storage.

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4 13. The data processing system as claimed in claim 8, wherein the apparatus is  
5 programmed to provide different storage access characteristics for the ports that provide  
6 access to the data storage.

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8 14. The data processing system as claimed in claim 8, wherein the apparatus is  
9 programmed with a respective private/shared flag for each port that provides access to  
10 the data storage for indicating whether or not said each port that provides access to the  
11 data storage provides access to data storage that is private to a respective one of the  
12 hosts.

13

14 15. The data processing system as claimed in claim 8, wherein the apparatus  
15 includes a graphical user interface for permitting a user to program the mapping of the  
16 hosts to the respective logical storage units, and the graphical user interface indicates  
17 which of the ports that provide access to the data storage are accessible to each host.

18

19 16. The data processing system as claimed in claim 1, wherein the data storage  
20 devices include disk drives in a cached disk storage subsystem.

21

22 17. The data processing system as claimed in claim 1, wherein the apparatus  
23 includes at least one fibre-channel switch providing the host ports, and wherein the  
24 hosts are connected to the fibre-channel switch by a fibre-channel data network.

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2 18. The data processing system as claimed in claim 1, wherein the apparatus  
3 includes a first switch coupling the hosts to the data storage devices and a second  
4 switch coupling the hosts to the data storage devices, wherein each switch has a host  
5 port coupled to each host.

6

7 19. The data processing system as claimed in claim 18, wherein the apparatus  
8 includes a controller for each switch, wherein each controller is programmed with the  
9 mapping of the hosts to the respective logical storage units.

10

11 20. An apparatus for coupling a plurality of hosts to a plurality of data processing  
12 devices, the apparatus comprising a switch having host ports for connection to the hosts  
13 and ports for providing access to the data storage devices, and a controller programmed  
14 with a mapping of the hosts to respective logical storage units configured from the data  
15 storage devices, wherein the controller is programmed for controlling the switch to  
16 respond to data storage access requests received at the host ports from the hosts for  
17 access to the logical storage units by decoding a host identifier and a logical storage  
18 unit specification from each data access request received at each host port, and  
19 determining whether or not the host identifier and the logical storage unit specification  
20 decoded from said each data access request are in conformance with the mapping, in  
21 order to permit data access of the logical storage unit to occur through said each host  
22 port when the host identifier and the logical storage unit specification decoded from  
23 said each data access request are in conformance with the mapping, and to deny access  
24 of the logical storage unit by said each host from occurring through said each host port

1 when the host identifier and the logical storage unit specification decoded from said  
2 each data access request are in not conformance with the mapping.

3

4 21. The apparatus as claimed in claim 20, wherein the mapping prohibits each host  
5 from accessing all of the logical storage units.

6

7 22. The apparatus as claimed in claim 20, wherein the mapping includes a  
8 respective mapping for each host of logical unit numbers of storage to data storage  
9 volumes configured from the data storage devices.

10

11 23. The apparatus as claimed in claim 22, wherein the mapping restricts the data  
12 storage volumes that are visible to said each host.

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14 24. The apparatus as claimed in claim 22, wherein the apparatus is programmed to  
15 report to said each host the logical unit numbers of storage accessible to said each host.

16

17 25. The apparatus as claimed in claim 20, wherein the apparatus is programmed  
18 with a mapping of the hosts to the ports that provide access to the data storage, and a  
19 mapping of logical volumes of storage that are accessible from each of the ports that  
20 provide access to the data storage.

21

22 26. The apparatus as claimed in claim 20, wherein one or more of the ports that  
23 provide access to the data storage are assigned to each host, a set of storage volumes are  
24 made accessible from each of the ports that provide access to the data storage, and the

1 apparatus is programmed so that said each host can access storage at said each of the  
2 ports that provide access to the data storage only if said each of the ports that provide  
3 access to the data storage has been assigned to said each host.  
4

5 27. The apparatus as claimed in claim 20, wherein the mapping includes a  
6 respective mapping for each host of logical unit numbers of storage to data storage  
7 volumes that are configured from the data storage devices and are accessible to said  
8 each host, and the apparatus is programmed to respond to a request directed to said each  
9 of the ports from said each host for a report of the logical unit numbers of storage that  
10 are accessible to said each host from said each of the ports that provide access to the  
11 data storage by providing a report of the logical unit numbers of storage that are  
12 accessible to said each host from said each of the ports that provide access to the data  
13 storage.  
14

15 28. The apparatus as claimed in claim 20, wherein the apparatus is programmed to  
16 provide different storage access characteristics for the ports that provide access to the  
17 data storage.  
18

19 29. The apparatus as claimed in claim 20, wherein the apparatus is programmed  
20 with a respective private/shared flag for each port that provides access to the data  
21 storage for indicating whether or not said each port that provides access to the data  
22 storage provides access to data storage that is private to a respective one of the hosts.  
23

1    30.    The apparatus as claimed in claim 20, wherein the apparatus includes a  
2    graphical user interface for permitting a user to program the mapping of the hosts to the  
3    respective logical storage units, and the graphical user interface indicates which of the  
4    ports that provide access to the data storage are accessible to each host.

5  
6    31.    The apparatus as claimed in claim 20, wherein the data storage devices include  
7    disk drives in a cached disk storage subsystem.

8  
9    32.    The apparatus as claimed in claim 20, wherein the switch is a fibre-channel  
10    switch, and wherein the hosts are connected to the fibre-channel switch by a fibre-  
11    channel data network.

12  
13    33.    In a data processing system including multiple hosts and multiple data storage  
14    devices, a method of operation of an apparatus for coupling the hosts to the data storage  
15    devices, the apparatus having host ports connected to the hosts, the data storage devices  
16    being configured into logical storage units, wherein the method includes:

17            programming the apparatus with a mapping of the hosts to the logical storage  
18    units; and

19            the apparatus responding to data storage access requests received at a host port  
20    from a host by permitting data access of a logical storage unit by the host to occur  
21    through a host port upon receipt at the host port of a request from the host for access to  
22    the logical storage unit when the request from the host for access to the logical storage  
23    unit is in conformance with the mapping, and denying data access by the host through



1 the host port upon receipt at the host port of a request from the host for data access that  
2 is not in conformance with the mapping.

3

4 34. The method as claimed in claim 33, which includes the apparatus responding to  
5 receipt at the host port of the request from the host for access to the logical storage unit  
6 by decoding a host identifier and a logical storage unit specification from the request for  
7 access to the logical storage unit, and determining whether or not the host identifier and  
8 the logical storage unit specification decoded from the request for access to the logical  
9 storage unit are in conformance with the mapping, and upon determining that the host  
10 identifier and the logical storage unit specification decoded from the request for access  
11 to the logical storage unit are in conformance with the mapping, permitting data access  
12 of the logical storage unit to occur at the host port.

13

14 35. The method as claimed in claim 33, wherein the mapping prohibits each host  
15 from accessing all of the logical storage units.

16

17 36. The method as claimed in claim 33, which includes programming the apparatus  
18 with a respective mapping for each host of logical unit numbers of storage to data  
19 storage volumes configured from the data storage devices.

20

21 37. The method as claimed in claim 36, wherein the mapping restricts the data  
22 storage volumes that are visible to said each host.

23

1 38. The method as claimed in claim 36, which includes the apparatus reporting to  
2 said each host the logical unit numbers of storage accessible to said each host.

3

4 39. The method as claimed in claim 33, wherein the apparatus includes a graphical  
5 user interface for permitting a user to program the mapping of the hosts to the  
6 respective logical storage units.

7

8 40. The method as claimed in claim 33, which includes the apparatus routing the  
9 data storage access requests from the host ports to ports that provide access to the data  
10 storage.

11

12 41. The method as claimed in claim 40, which includes programming the apparatus  
13 with a mapping of the hosts to the ports that provide access to the data storage.

14

15 42. The method as claimed in claim 41, which includes programming the apparatus  
16 with a mapping of logical volumes of storage that are accessible from each of the ports  
17 that provide access to the data storage.

18

19 43. The method as claimed in claim 40, which includes assigning to each host one  
20 or more of the ports that provide access to the data storage, and mapping a set of  
21 storage volumes to each port that provides access to the data storage, so that said each  
22 host can access storage at said each port that provides access to the data storage only if  
23 said each port that provides access to the data storage has been assigned to said each  
24 host.

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2 44. The method as claimed in claim 40, wherein the mapping includes a respective  
3 mapping for each host of logical unit numbers of storage to data storage volumes that  
4 are configured from the data storage devices and are accessible to said each host, and  
5 which includes the apparatus responding to a request from said each host for a report of  
6 the logical unit numbers of storage that are accessible to said each host from said each  
7 of the ports that provide access to the data storage by providing a report of the logical  
8 unit numbers of storage that are accessible to said each host from said each of the ports  
9 that provide access to the data storage.

10

11 45. The method as claimed in claim 40, which includes the apparatus providing  
12 different storage access characteristics for the ports that provide access to the data  
13 storage.

14

15 46. The method as claimed in claim 40, which includes programming the apparatus  
16 with a respective private/shared flag for each of the ports that provide access to the data  
17 storage, the respective private/shared flag indicating whether or not said each of the  
18 ports that provides access to the data storage provides data storage that is private to a  
19 respective one of the hosts.

20

21 47. The method as claimed in claim 40, which includes operating a graphical user  
22 interface for programming the mapping of the hosts to the respective logical storage  
23 units, the graphical user interface indicating which of the ports that provide access to  
24 the data storage are accessible to each host.